ASPECTS OF THE ECOLOGY OF SMOOTH-COATED OTTER *LUTROGALE PERSPICILLATA* GEOFFROY ST.-HILAIRE, 1826: A REVIEW

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Of the thirteen species of Otters reported worldwide four are found in Asia, and India is home to three species. The Smooth-coated Otter *Lutrogale perspicillata* is the most common of Asian Otters, being distributed throughout India from the Himalayas southward. It prefers habitats such as large rivers, lakes and swamps and tends to compete for resources with the Small-clawed Otter *Aonyx cinereus* and Eurasian Otter *Lutra lutra* when all the three species occur sympatrically. The species is listed as Vulnerable by the IUCN and is on Appendix II of the CITES and Schedule II (Part II) of the Indian Wildlife (Protection) Act, 1972. While some measure of research has been established, Otter conservation efforts in India are lagging far behind those in Europe and the rest of the world. This review summarizes the current conservation status and aspects of ecology of the Smooth-coated Otter, suggesting areas/aspects of future research particularly with respect to India. The need for such a review arises from a necessity to direct further research efforts towards wetlands and freshwater biomes in general, and those of Otters in particular, and also to meet demands for conservation management.

Key words: Smooth-coated Otter, *Lutrogale perspicillata*, ecology, review, conservation management, India

INTRODUCTION

Otters are semi-aquatic members of the Mustelidae family, and as high-order carnivores at the top of their small niche eco-systems their presence serves as an important biological indicator of wetland quality (Sivasothi and Burhanuddin 1994). Phylogenetically, the Otter family tree dates to the Miocene era, with Otter-like forms represented by genus *Mionictis*, inhabiting the Earth 20 million years ago (Hwang and Larivie're 2005). Of the 13 species of Otters worldwide, Sea Otter *Enhydra lutris* and Marine Otter *Lutra felina* are restricted to marine environments and the rest eleven inhabit mostly freshwater habitats (Estes *et al.* 1982). Four species of Otters are reported from Asia (Kruuk 2006): Hairy-nosed Otter *Lutra sumatrana*, Eurasian Otter *L. lutra*, Smooth-coated Otter *Lutrogale perspicillata*, and Small-clawed Otter *Aonyx cinereus*; of these the last three are found in India (Pocock 1941; Mason and Macdonald 1986; Kruuk 2006). The Smooth-coated Otter is distributed throughout the country from the Himalayas southward, but the Eurasian Otter and the Small-clawed Otter are restricted to the Himalayas, to the north of the Ganges and to southern India. Occurrence of all three species has been reported from north-east India and the Western Ghats (Hussain 1999).

Otters in general are becoming increasingly rare outside of national parks and wildlife sanctuaries, being threatened in many areas and that habitat destruction and poaching pose as a major threat as compared to other disturbances (Nawab 2007). The status of Otters in India is feebly documented and most of the distributional records are largely subjective or are based on chance observations, the results remaining inconclusive and consequently no concrete database exists for monitoring Otter population trends. This review summarizes the current conservation status and aspects of ecology of the Smooth-coated Otter *Lutrogale perspicillata* suggesting areas/aspects of future research on the species particularly with respect to India.

Species profile

Lutrogale is from the Latin *lutr* meaning Otter, and *gale* meaning weasel or cat. The specific name *perspicillata* is Latin for conspicuous (Borror 1960). *Lutrogale* is known from the early Pleistocene of Java (McKenna and Bell 1997). The genetic structure of *Lutrogale perspicillata* is 2n=38, with a fundamental number of 62 (van Zyll de Jong 1987). The Otter may weigh up to 11.4 kg, the total length ranging between 1,067-1,300 mm (Harrison and Bates 1991; Foster-Turley 1992). In its external characters the Smooth-coated Otter is characterized by a very smooth, sleek pelage (Francis 2001). Upper lip to the edge of the rhinarium, cheeks, sides of the neck and throat are whitish or grey (Pocock 1941; Tate 1947). The underfur and guard hairs are 8 mm and 12 mm in length respectively. Muzzle is not spotted and the rhinarium is bare, dusky with peaked upper margin (inverted V-shaped). Vibrissae are white, <90 mm in length and well-developed. Eyes and ears are small. Tail is flattened, limbs are short, strong, and the fore and hind paws are large and well-webbed (Harrison 1968).

Distribution and Conservation Status

The distribution of Smooth-coated Otter is disjunct (Fig. 1) being distributed throughout southern Asia (Hwang and Larivie're 2005). Of the three subspecies, *Lutrogale*

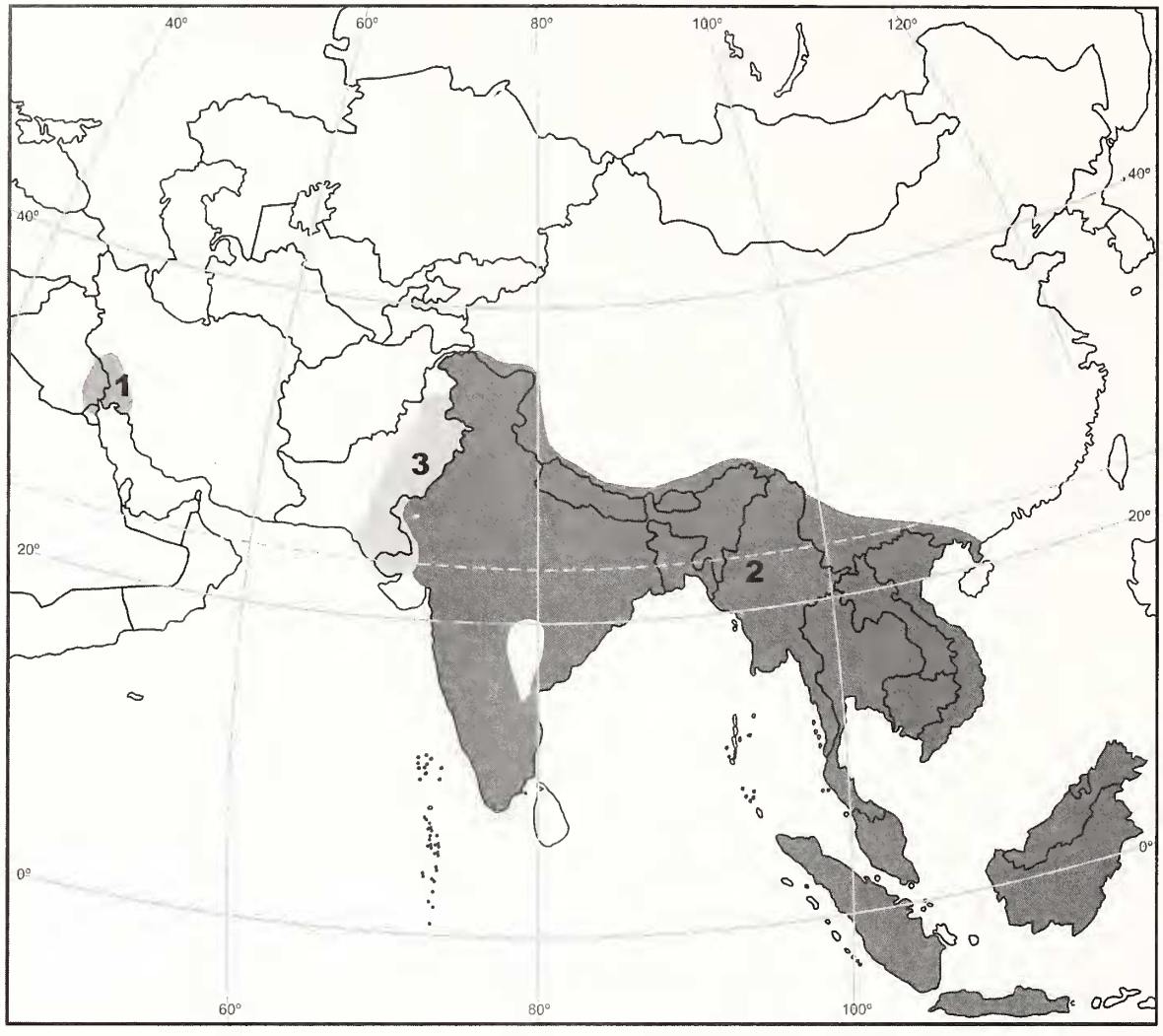

Fig. 1: Distribution of Smooth-coated Otter *Lutrogale perspicillata* in Asia
1. *L.p. maxwelli*, 2. *L.p. perspicillata* and 3. *L.p. sindica*.
Source: Hwang & Larivie're (2005)

perspicillata perspicillata has a wider distribution and occurs in most of India, Nepal, east to south-western Yunnan, Indo-China, and south to Malaysia, Sumatra, and Java. *L.p. sindica* occurs in Pakistan (Hwang and Larivie're 2005) and is also reported from India (Pocock 1941). *L.p. maxwelli*, whose current status is uncertain, is reported from the marshes of southern Iraq (Mason and Macdonald 1986). In India, the Smooth-coated Otter in most of its range is sympatric with the Small-clawed Otter *Aonyx cinereus*, and sometimes also with the Common Otter *Lutra lutra* (Foster-Turley 1992). The Smooth-coated Otter is under Schedule II (Part II) of the Indian Wildlife (Protection) Act, 1972, and is listed as Vulnerable (VU) by the IUCN and is on Appendix II of the CITES.

Habitat use

Otter habitat appears to be extremely variable, however, more accurately it can be characterised as a narrow strip on either side of the interface between water and land by being to some extent one-dimensional, i.e., linear (Kruuk 2006). Stumpf and Mohr (1962) asserted that the expression of home range in terms of linear units is justifiable for a number of species, including Otters, and home ranges of Otters living in riverine habitat are estimated in linear units (Erlinge 1967; Melquist and Hornocker 1979). Similarly, the length of coastal shoreline has often been used to quantify the home range of Otters living in marine (Kruuk and Hewson 1978; Arden-Clarke 1986) and Lacustrine habitats (Erlinge 1967). The linearity of the habitat makes confrontation inevitable, affecting competition for resources. In such case, Kruuk (2006) has suggested random dispersion, with tolerance between individuals by some kind of group territorial system among Otters. Moreover, there appear to be differences in the spatial organisation in different areas, and there is variation in group size and range size, which can be

explained in terms of adaptation to environmental characteristics in which resource dispersion hypothesis plays an important role (Macdonald 1983; Carr and Macdonald 1986).

Lutrogale perspicillata is essentially a plains' Otter preferring low elevations. In the Indian subcontinent they are adapted to live in north-western desert, dry zone of central India and the Deccan plateau (Prater 1998). In general, they occur along the large rivers and lakes, Peat swamp forests, mangrove forests along the coast and estuaries, and even use rice fields for foraging (Shariff 1984; Foster-Turley 1992; Melisch *et al.* 1994; Sivasothi and Burhanuddin 1994). When occupying saltwater areas, they require freshwater nearby (Wayre 1978; Kruuk *et al.* 1994). When it occurs sympatrically with other Otter species it tends to use larger water bodies, and does not occur on small streams and irrigation canals (Wayre 1978). As reported for Eurasian Otter *Lutra lutra*, reservoirs are used; they form artificial habitats (Ruiz-Olmo *et al.* 2005) and usually serve as travel lanes (Sheldon and Toll 1964). In India, Anoop and Hussain (2004) recorded presence of *Lutrogale perspicillata* along the shallower and narrower regions of the lake in Periyar Tiger Reserve, while conversely, Nawab (2007) recorded that the Ramganga reservoir in Corbett Tiger Reserve; with steep shore lines, deep water, absence of escape cover and presence of mugger (major predator of Otters) was found unsuitable for Smooth-coated Otters. Along the larger perennial water bodies in India, Smooth-coated Otter show preference for rocky and sandy stretches in all the seasons, since these stretches provide sites for denning and grooming. River stretches with bank side vegetation are favoured as they provide escape cover while travelling or foraging (Nawab 2007). Hussain and Choudhury (1995) recorded in Chambal river that an adult female with cubs defended a home range of 5.5 km while for an adult male it was estimated as approximately 17 km. Also, the home range of the adult male overlapped extensively with that of several female home ranges. Studies in northern India recorded smaller home ranges of Smooth-coated Otters. This suggests that Otters tend to adapt to their available environment in patchy and disturbed sites, restricting their movement (Nawab 2007).

Food and feeding habits

Diet and feeding habits of Otters is one aspect of their ecology that has been studied widely in different parts of the world (summaries in Mason and Macdonald 1986). Tooth morphology of the fossils suggests that older forms of *Lutrogale* fed mainly on shellfish (Willemsen 1986). Smooth-coated Otters have generally been described as fish specialist (Haque and Vijayan 1995; Anoop and Hussain 2005; Nawab 2007). During a study on the feeding ecology of this species in Corbett Tiger Reserve, northern India, four prey categories were identified from 499 spraints analysed; fish (84%) was the most frequently occurring item and also formed the bulk (97.27%) of the diet (Nawab 2007). Prater (1998), Foster-Turly (1992) and Hussain (1993) have established that the exploitation of secondary prey, especially in winter, such as shrimp/crayfish, crab and insects, and other vertebrates such as frog, mudskippers, birds and rats may be a strategy for meeting additional energy requirements for thermoregulation and for rearing pups. Smooth-coated Otter are strong swimmers and hunt in groups (Kruuk *et al.* 1994), preferring shallow and placid waters (Nawab 2007). When fishing they travel in a V-formation going upstream (Helvoort *et al.* 1996). Most foraging activity occurs in water and small fish are swallowed whole (Helvoort *et al.* 1996), but large fish are taken to shore (Ansell 1947). Spraint sites of Smooth-coated Otter occur on small rocks, sand banks and large boulders 1-3 m above water level and these sites often smell of rotten fish (Kruuk *et al.* 1993; Nawab 2007). Shariff (1984) recorded these animals to roll and rub on grassy areas, especially after defecation and to sometimes rest on bare sand. When groups of Smooth-coated Otter forage, the commotion may attract birds which benefit from the smaller fish that flee into shallow water (Kruuk *et al.* 1993; Helvoort *et al.* 1996). However, these interactions may be detrimental to Otters because birds attempt to steal fish (Helvoort *et al.* 1996). Studies on the dietary habits of mugger in Andhra Pradesh have revealed the presence of Otter furs in the scats of Indian marsh crocodile (Kumar *et al.* 1995); and alternately crocodile hatchlings can also be potential prey for Otters (Kumar 1993).

Reproduction

In captivity, Smooth-coated Otters are known to attain sexual maturity at twenty-two months and mate during August to November. Males are polygamous mating with up to four females (Desai 1974); copulation occurs in water lasting <1 min (Yadav 1967; Badham 1973) followed by prolonged playful bouts between partners. The gestation period varies from 60 to 62 days (Yadav 1967; Desai 1974; Naidu and Malhotra 1989) and a litter of 2-5 pups is born. Smooth-coated Otters often dig their own breeding dens (Badham 1973; Wayre 1978; Nawab 2007) and maintain small family groups of a mated pair with up to four offsprings from previous seasons (Wayre 1978). Captive studies suggest that the longest lifespan of Smooth-coated Otters is around 20 years and 5 months (Medway 1969; Acharjyo and Mishra 1983; Chakrabarti 1993).

Threats

Developmental activities such as construction of dams adversely affect Otter populations due to the reduction of water flow downstream denying access to prey and den sites (Ruiz-Olmo *et al.* 1991). Randell and Leatherwood (1994) have commented on the changes in prey dynamics, which are the consequences of waterway obstruction, such as less diversity and small biomass of prey in impoundment upstream of dams due to lowered nutrient availability and reduction in prey due to blocked migratory routes. In Europe, studies on Otters (Jimenez and Lacomba 1991) have revealed that infrastructural activities can cause extinction of Otter populations from the lower and upper reaches of a river system and that the species gets confined to the less productive stretches. Otters also require undisturbed bank side cover for their survival. The depletion of sand from banks decreases the number of sites where Otters can groom and bask (Anoop and Hussain 2004; Nawab 2007).

Otters are often in direct conflict with fishermen who view them as vermin or competitors for fish and kill them (Foster-Turley 1992). Unimpeded fishing practices using destructive methods, such as dynamiting, *ghan* or hammering and use of Ichthyotoxic plants to poison fish forms a major form of disturbance to Otters. This leads to indiscriminate killing of large number of fish (juvenile as well as brood fish) that adversely affects the population of fish as well as the water quality (Nawab 2007).

Wildlife conservation efforts in India and concern about illegal wildlife trade has largely been concentrated on large fauna such as tigers, leopards, elephants and rhino amidst much public outcry to protect these species. In spite of the general awareness of the trade in wildlife and its derivatives in India, there is little information on the extent and prevalence of illegal trade in Otter skins, and consequently the threats to the species (Nawab and Gautam 2008). Otters are hunted for their pelts, meat, fat and other body parts (Meena 2002). Seizure figures of wildlife offences in the country reveal that 20-30% of the fur trade is in Otter skins. The main markets are Kanpur, Lucknow, Kota, Kolkata, Bengaluru and Delhi. The Otter fur trade, which is practiced in many parts of the world, routes out via Nepal and Bangladesh to importing countries (Hanfee and Ahmad 1999). Nomadic hunting tribes in India, such as *Gilhara*, *Badiya* and *Jogis* are known to regularly kill Otters for their skin and flesh (Walia 2001; Nawab 2008). Tribals and traditional practitioners of *Ayurveda* in Andhra Pradesh are known to use Otter blood as a cure for epilepsy (Nagulu *et al.* 1999).

Research and Conservation Advocacy

In Asia, research on Otters date backs to 1988 when the first International Symposium on Asian Otters was held in India (Foster-Turley *et al.* 1990; Hussain 1999). Since then major doctoral works carried out on Smooth-coated Otter include: northern India (Nawab 2007), central India (Hussain 1993) and southern India (Satyanarayana 1997). A few short-term studies have also been conducted (Nagulu *et al.* 1997; Anoop 2001; Shenoy 2003; Perinchery 2008). Surveys to determine where Otter populations still exist and where greater habitat protection measures are necessary are the first step. Parallel efforts involve research into such areas as the ecological requirements of Otters, their reproductive biology, and the effects of deleterious pollutants in the food chain. Practical habitat management activities ranging from basic field research programmes, to planning and advising Government in undertaking large-scale development projects on species specific habitat management (Hussain 1999). Even more perplexing than the lack of ecological information about Otters is an apparent lack of interest in Otters in India (Nawab 2006); hence awareness generation towards the plight faced by Otters and their ecological and aesthetic importance to aquatic environments should form an integral part of such studies to reinforce sympathetic attitude from the general public.

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